

CountyStat Rotational Fellowship Program Training Manual

September 15, 2008

Dear Reader:

In an effort to build capacity while creating an environment of transparency and accountability in Montgomery County Government, we are pleased to offer this new opportunity for selected County employees to participate in the CountyStat process through a new rotational fellowship program.

Each quarter, two applicants will be selected as CountyStat Rotational Fellows to work part-time for 10 weeks in the CountyStat office. In this role, participants will work with the CountyStat team and County Executive's Office to develop and improve their data analysis and presentation skills, develop a better understanding of data-driven performance measurement, and interact with County leadership. Those selected as participants in the program will be expected to participate in CountyStat meetings and, upon completion of the rotation, continue to serve as a departmental liaison with the CountyStat team.

This document, the CountyStat Rotational Fellowship Program Training Manual, has been created as a resource to both fellows and other department staff to provide guidance on many topics with which CountyStat is concerned. It is important to recognize that this manual, in many respects, merely serves as an introduction to the questions departments should be asking of themselves and points to consider when making performance measurement and data analysis decisions. It is CountyStat's goal to use this fellowship, and this manual as a supplement, to build additional capacity within departments to accomplish more rigorous data analysis to improve operational effectiveness.

Sincerely,

Chris Cihlar, CountyStat Manager

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Fellowship Objectives

- Develop an understanding and appreciation for CountyStat principles of requiring data driven performance, promoting strategic governance, increasing government transparency, and fostering a culture of accountability and “managing for results.”
- Improve quantitative and qualitative data gathering and analysis skills, with particular emphasis on evaluating data integrity, and applying data to program evaluation and performance measurement.
- Improve knowledge and use of data analysis tools, including department and County-specific databases and applications.
- Improve presentation-building skills, with a focus on the appropriate development and display of data and narrative.
- Interact with County leadership in relation to his/her assigned issue and participate in discussions and decisions.

Purpose of this Manual

- To provide information about CountyStat, its purpose, and process.
- To further define and clarify key terms and methodology.
- To provide guidance on topics relevant to improving the responsiveness and efficiency of government through data-driven analysis and discussion.
- To serve as a resource to CountyStat Rotational Fellows and to staff across County government who serve as CountyStat liaisons.

CountyStat Staff

CountyStat operates within the Offices of the County Executive, with oversight from Fariba Kassiri, Assistant Chief Administrative Officer.

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What is CountyStat?

CountyStat is a new program to address one of the County Executive's priority objectives:

" A Responsive and Accountable County Government"

“Our residents have the right to expect every County department and every County employee to be responsive and accountable every day. To accomplish this goal, I have introduced the ‘CountyStat’ initiative, which will help us provide more effective and efficient customer service by increasing performance and ensuring that we get results. CountyStat will track information about the problems we face and the measures we are taking to address them– in real time, not with data that is old and irrelevant. I am confident that CountyStat will make our good government even better.”

- Montgomery County Executive Isiah Leggett

CountyStat consists of a series of regular meetings during which the County Executive and the Chief Administrative Officer use real-time data to discuss the departments' performance strategies. The main objective is to improve the efficiency and responsiveness of government by using up-to-date data as the ongoing focus for day-to-day management and long-term policy making.

CountyStat Principles

- Require data driven performance
- Promote strategic governance
- Increase government transparency
- Foster a culture of accountability

CountyStat Meeting Rules

- Meetings begin and end on time and last exactly one hour
- Meetings participants are seated around the table; questions and comments are not fielded from the audience
- Meetings are focused, data-driven discussions that emphasize results and next steps

CountyStat seeks to improve performance through creating greater accountability, providing better transparency into County operations, applying data analytics to the decision-making process, and ensuring decisions are implemented through relentless follow-up.

History of CountyStat

CountyStat History

- **Proposed by County Executive Leggett**
- **Team of managers and citizens provided program definition**
 - Visited other Stat programs: CitiStat in Baltimore and CapStat in DC
 - Reviewed literature about other Stat programs
 - Determined program tone and large-scale features
 - Hired first analyst in July 2007 to assist in program creation
- **Program establishment**
 - Determining where CountyStat fit with other new initiatives: ERP, CRM, Results Based Budgeting, departmental performance plans
 - Selection of initial meeting topics
 - Creation of budget and staffing plan
 - Creation of physical offices at 255 Rockville Pike, Suite L-10
 - Hired CountyStat manager in January 2008
- **First CountyStat meeting held January 30, 2008**
 - Topic: Performance Plan of the Department of Correction and Rehabilitation
 - Current CountyStat staffing: one manager and four analysts



Council Overview

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7/30/2008



CountyStat History (cont.)

- **Conceptualization**
 - December 2006: Creation of a Stat program proposed in County Executive Leggett's Transition Team report
 - January 2007-July 2007: Team of upper managers and citizens work on program conceptualization by visiting regional Stat programs and reviewing relevant literature
- **Development**
 - July 2007: First CountyStat analyst hired to assist in program development
 - August – December 2007: Creation of CountyStat offices at 255 Rockville Pike, selection of initial topics, and development of budget and hiring plan
 - January 2008: CountyStat manager hired
- **Operations**
 - January 30, 2008: First CountyStat meeting held on the topic of the Department of Correction of Rehabilitation's Performance Plan
 - March 2008: Additional CountyStat analysts hired
 - June 2008: Fourth and final CountyStat analyst hired



Council Overview

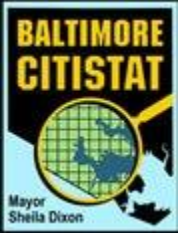

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Figure 1 CountyStat Presentation to County Council

CountyStat Compared to Other Regional Stat Programs

Program	Overview	Similarities	Differences
CitiStat (Baltimore) 	<ul style="list-style-type: none"> -The original local government “Stat” program -Started in 2000 by then-Mayor Martin O’Malley -Known for being more confrontational than most “Stat” programs -Characterized by frequent meetings and regular collection of standard data -Topics typically involve a single department -Limited data analysis by CitiStat staff 	<ul style="list-style-type: none"> -Regular follow-up on topics 	<ul style="list-style-type: none"> -CountyStat has a more collegial atmosphere -CountyStat relies upon greater data analysis -CountyStat examines both single- and multi-department topics
CapStat (DC) 	<ul style="list-style-type: none"> -Started in 2006 by then-Mayor Anthony Williams as a technology project and then retooled and given a more analytic focus by Mayor Adrian Fenty; continues to act as a data warehouse -Has two classes of meetings: <ul style="list-style-type: none"> -Public topical meetings that involve multiple departments -Private unadvertised, single-department operational meetings -Topics are chosen on a somewhat ad-hoc basis depending upon current or upcoming events 	<ul style="list-style-type: none"> -Both examine a combination of single- and multi-department issues 	<ul style="list-style-type: none"> -CountyStat revisits topics more regularly to ensure closer follow-up -CountyStat does not act as a data warehouse -All CountyStat meetings are shown on the County website

While based on the traditional CitiStat process, the CountyStat process focuses on collaboration to create agreement on potential solutions to challenges facing Montgomery County.

Purpose of CountyStat in Montgomery County Government

CountyStat's activities have evolved around three key themes:

1. Capacity Building

CountyStat moves beyond the problem identification phase to the capacity building phase, in order to construct more self-sufficient departments. With the proper training, tools, and awareness, departments continually provide CountyStat with progress updates. These updates serve as the basis for meetings and help inform policymakers' decisions.

Departmental Overtime Expenditure Tracking

CountyStat developed a module that allows the five highest-overtime grossing departments to track their expenditures and report on this utilization on a bi-monthly basis. This originally-developed tool was rolled out to each department with an accompanying training session and user guide. The user guide provides step-by-step instructions on how to report overtime expenditures. This capacity building step ensures greater continuity in overtime reporting and increases departments' ability to closely monitor their operational procedures and practices.

2. Policy Translation

CountyStat assists policymakers by ensuring that their message is accurately interpreted and set into action by departments. Through ongoing facilitation and rigorous follow-up, CountyStat provides a forum for the continual monitoring of programmatic performance as it relates to County policies. In many instances, high-level policy requires numerous departments working in coordination; it is essential that all departmental data supports overall performance reporting.

Positive Youth Development Initiative

Creating a positive impact on the lives of youth in Montgomery County requires the systematic cooperation of many stakeholders within and outside of County Government. CountyStat assists policymakers by translating policy guidance into operational means that can be used to formulate performance measures. CountyStat drafted the first complete inventory of all County programs associated with positive youth development and outlined variables for each program that determine if programs are having a measurable impact on the policies advocated by the County.

3. Data Analytics and Integration

CountyStat found that departments' spatial analysis capabilities are not widely recognized and that their GIS function revolves around map generation rather than analysis. CountyStat is working closely with individual departments to build their data analytics and integration capacity. With this ongoing support, CountyStat will increase the uniformity of data collection, validity of collected data, and increase inter-departmental program analysis.

Pedestrian Safety Intersection Prioritization
The creation of safe streets for pedestrian access and use is an important public safety issue in Montgomery County. To assist the Department of Transportation and the Police Department, CountyStat conducted spatial analysis that assist in the identification of priority intersections. This spatial analysis serves as the basis for examining the methodology behind the creation of pedestrian safety projects and ensures that data analysis drives intersection prioritization.

CountyStat holds three types of meetings:

Performance Plans	Meetings focus on the creation of individual departmental performance plans through the development of performance measures and application of rigorous follow-up.
Cross Agency Initiatives	Meetings focus on implementation of the County Executive's cross-agency initiatives by continually assessing the status of ongoing efforts and the creation of performance measures that guide departmental activities.
Departmental Issues	Meetings focus on issues that impact one or multiple departments and require coordination amongst departmental directors and staff. These meetings provide timely response to critical issues facing Montgomery County.

CountyStat Meeting Process: Required Steps for Analysts

When building and delivering a presentation, the lead analyst must be sure to follow these steps:

1. **Set Tentative Date:** Send an Outlook calendar invitation through the CountyStat email account to the involved department heads well in advance of the tentative meeting date.
2. **Announcement and Attendance Sheet:** CountyStat analyst writes the announcement and attendance sheet. Chris delivers to department heads. Analysts inform contacts of meeting, if applicable. (Approximately 3 weeks prior to meeting)
3. **Draft Presentation Dry Run:** CountyStat analyst and Chris dry run presentation with Tim and Fariba the Wednesday afternoon (3:00pm) prior to the meeting.
4. **Deliver Slides to Participants:** A draft presentation is delivered to CountyStat participants no later than the Wednesday before the meeting, COB. Analyst finalizes draft and Chris delivers to Department heads. Analysts then may deliver draft presentation to other relevant participants.
5. **Deliver Slides to weekly list:** Slides delivered to list of regular attendees. (OMB Director, DTS Director, etc.)
6. **Deliver Final Presentation with notes to Tim:** Following the dry run, revise presentation to accommodate Tim and Fariba's suggestions. Notes for the presentation need to be included and delivered to Tim, no later than noon the day before final presentation. Analyst builds the presentation, Chris adds notes and delivers. Also included is the projected time for each slide.
7. **Divide presentation into two for screens:** No later than Thursday COB, the presentation needs to be divided and prepared for delivery on two screens. Analyst builds and dry runs with Chris.
8. **Deliver attendance list to Tim:** No later than COB the day before presentation, Analyst prepares an attendance list. Chris delivers to Fariba and Tim.
9. **Create name tags:** No later than COB the day before, presentation name tags for those sitting at the table are prepared and seating arrangement is finalized. Analyst.
10. **Print copies of presentation:** Linear copies of the presentation are printed and placed at the table. All participants get one full sized, black and white copy. Tim has a color copy with notes. Before meeting. Analyst responsibility. Full size copies are put aside for the OMB Director, DTS Director and representative from MCCF (Wayne Goldstein). Make 7-10 handout copies for the audience (4 slides to a page, double-sided).
11. **Staff door for sign in sheet and seat assignment:** One analyst who is not presenting needs to staff door for sign in sheet and seat assignment directions.
12. **Follow up memo delivered.** No later than one business day after presentation a follow up memo with items identified during meeting is written and sent to Chris. Chris edits and sends to Fariba who finalizes. Chris then distributes memo to department heads.
13. **Follow-up items:** Analyst ensures deadlines specified in follow-up memo are met.
14. **Final Copy:** Analyst ensures final copy of presentation is included in work binder along with follow-up item memo.

Data Analysis: Performance Measurement

Section Objectives

- Define performance measurement and state its importance in Montgomery County government.
- Differentiate between performance measurement and program evaluation.
- List and define the different types of performance measures, and know when best to apply each.
- Describe what constitutes a good performance measurement system and apply it to departmental headline performance measures.
- Recognize how to address the limitations of performance measurement.
- Validate and verify departmental performance data for integrity.
- Apply guidelines for proper survey use to departmental surveys.

Citizens are continually expecting more responsive and competitive government. In order to produce the best service for its residents, sound information on government performance is vital. In addition, performance measurement is important because of the benefits it provides in reorienting organizational culture towards continuous improvement, transparency and accountability. In general, it can supplement the following:

- Strategic planning and goal setting
- Strengthening accountability
- Decision-making
- Improving customer service
- Assisting governments in determining effective resource use

This Data Analysis section will define key terms and make distinctions between key concepts, particularly for the purpose of applying them to Montgomery County Government. It will also give guidelines for constructing solid performance measures and address concerns for the limitations of performance measurement. It will provide additional guidance for the construction, use and application of surveys for performance measurement purposes. It will then provide a discussion of data integrity and provide guidance in addressing such issues.

Performance Measurement Basics

Performance measurement consists of the ongoing monitoring and reporting specific information regarding the results of County services. It includes the measurement of the kind of job we are doing, and the impacts on the community. This is typically conducted by program or agency management.

A **program** may be any activity, project, function, or policy that has an identifiable purpose or set of objectives.

Performance measures may address the type or level of program activities conducted (process), the direct products and services delivered by a program (outputs), and/or the results of those

products and services (outcomes). Along with strategic planning, benchmarking and continuous follow-up, performance measurement forms the center of managing for results.

Program evaluation, while following similar principles, is somewhat different from performance measurement. Program evaluations are usually individual studies conducted periodically or on an ad hoc basis to assess how well a program is working. They are conducted by experts outside the program, as well as by program managers. A program evaluation typically examines how well the program has achieved its objectives, given other aspects of program performance.

Performance Measurement in Montgomery County

Each department is responsible for developing and maintaining a performance plan, which documents its contribution to Montgomery Results, what the department does and for whom, its headline performance measures, and the contributing and restricting factors that play into the results of those measures.

Result Areas (CE Priorities)

- A Responsive and Accountable County Government
- Affordable Housing in an Inclusive Community
- An Effective and Efficient Transportation Network
- Children Prepared to Live and Learn
- Healthy and Sustainable Communities
- Safe Streets and Secure Neighborhoods
- A Strong and Vibrant Economy
- Vital Living for All Residents

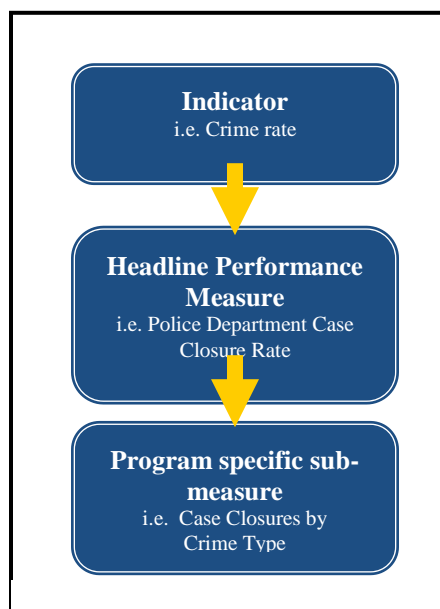


Figure 2 Relationship between key terms

Headline Measures are those key measures that represent the department's activities overall. They should be linked to both departmental activities and the County Executive's eight priorities. Indicators, on the other hand, are higher level and more broad-reaching than headline measures. These would include such things as the crime rate, and infant mortality, where the County's programs and services have some impact, but there are larger factors in play. Performance sub-measures are those measures that link budget items to departmental Headline Performance Measures and monitor results achieved at programmatic level.

When assessing the performance of a department, it is important to consider both the contributing and restricting factors in order to tell a more complete story. Contributing factors are those help the department succeed and restricting

factors are those stumbling blocks that may inhibit a department from performing adequately. It will be the responsibility of departments to update headline performance measure data on a regular basis. How often that is depends on the nature of the measure; it could be annually, biannually, or quarterly.

Types of Performance Measures

Terminology	Definition	Examples
Input	Value of resources used to produce an	▪ Dollars budgeted/spent

	output.	<ul style="list-style-type: none"> ▪ Staff hours used
Output	<p>Quantity or number of units produced.</p> <p>Outputs are activity-oriented, measurable, and usually under managerial control.</p>	<ul style="list-style-type: none"> ▪ Eligibility interviews conducted ▪ Library books checked out ▪ Children immunized ▪ Prisoners boarded ▪ Purchase orders issued ▪ Patients transported
Service Quality	Degree to which customers are satisfied with a program, or how accurately or timely a service is provided.	<ul style="list-style-type: none"> ▪ Percent of respondents satisfied with service ▪ Error rate per data entry operator ▪ Frequency of repeat repairs ▪ Average days to address a facility work order
Outcome	Qualitative consequences associated with a program/service (the ultimate benefit to the customer). External forces can sometimes limit managerial control; however, managers are still responsible for outcomes associated with their programs.	<ul style="list-style-type: none"> ▪ Reductions in fire deaths/injuries ▪ Percent of job trainees who hold a job for more than 6 months

Note: Outcome measures are the most valuable when trying to get at the ultimate “why” of providing a service, and so this is the direction Montgomery County is moving in, in terms of its departmental headline measures. In addition, service quality and output measures are sometimes used as a supplement to a department’s headline outcome measures.

What Constitutes a Good Performance Measurement System?

When analyzing headline performance measures, it is important to keep the following things in mind. Measures should be:

Results-oriented - focused primarily on desired outcomes, less emphasis on outputs

Important - concentrate on significant matters

Reliable – accurate, consistent information over time

Useful - information is valuable to both policy and program decision-makers and can be used to provide continuous feedback on performance to agency staff and managers

Quantitative - expressed in terms of numbers or percentages

Realistic - measures are set that can be calculated

Easy to interpret - do not require an advanced degree in statistics to use and understand

Comparable - can be used for benchmarking against other organizations, internally and externally

Credible - users have confidence in the validity of the data

Limitations of Performance Measurement

In theory, performance measurement has many benefits and advantages as well as limitations. Some try to use these limitations as reasons not to pursue performance measurement, and in doing so, forego its benefits. The following includes the typical arguments used; the response to those reasons follows each one.

You can't measure what I do.

RESPONSE: Areas previously thought to be “unmeasurable” such as education, welfare, and even international relations have been shown to be measurable if someone is motivated and creative enough to pursue an innovative approach. Since so many governments have initiated performance measurement in recent years (and others have done so for quite some time), more information than ever exists for staff to reference.

It's not fair because I don't have total control over the outcome or the impact.

RESPONSE: It is the rare program that anyone has total control over the outcome, but if you can't demonstrate any impact on the result, then why are we funding your program?

It will invite unfair comparisons.

RESPONSE: Comparison is going to happen whether you like it or not. By taking the initiative in selecting comparable organizations, you can help your program by proactively comparing performance, determining how well you are doing, and seeking ways to improve your performance.

It will be used against me.

RESPONSE: Demonstrating openness and accountability, even when the news is not so good, inspires trust. If you are open about where you need to improve, most people will give you the benefit of the doubt as long as you demonstrate that you are sincerely seeking to improve.

It's just a passing fad.

RESPONSE: Anyone who thinks performance measurement is just a passing fad need only pick up any public administration-related document to learn that it is being used at the federal, state and local levels of government, with no indication that the requirements for its use, i.e., accountability, continuous improvement, better information for decision makers, etc. will abate. In fact, if anything, pressure to demonstrate accountability and improvement is only expected to increase.

We don't have the data/we can't get the data.

RESPONSE: In this age of information technology, it is hard to believe that performance data are not available. It can be as simple as a desktop spreadsheet using information collected from a hard-copy log or it can be trained observer ratings, with numerous variations in-between. What is important is that critical indicators of success are identified and measured consistently and conscientiously.

We don't have the staff resources to collect the data.

RESPONSE: Dedicating 5 percent of their time to come up with thoughtful measures, collecting the data on those measures, and then using the data to manage for results, will generally save a

larger portion of their time that they would have spent correcting service problems down the road.

Using Surveys as a Data Source for a Performance Measure

Service quality, representing the timeliness, accuracy, or customer satisfaction with a specific service, can be an important aspect of performance measurement for a department. There are various means to obtain this data, surveying being one of those methods. This section will provide a brief guide to basic survey principles.

Surveying is a means of gathering information about a particular population through two options: either questioning each member of the population or by sampling some of its members usually through a system of standardized questions, conducted by mail, telephone, or personal interview. They can be administered either to individuals or groups. The primary purpose of a survey is to elicit information which, after evaluation, results in a profile or statistical characterization of a population sample.

1. What information is needed in order to understand the problem, its causes and suggest possible solutions defined in the problem statement? *Can the necessary information be obtained through means other than a survey?*
2. How will the information be used and by whom?
3. What/who is the population to be studied?
4. What kinds of analyses would be useful to understand survey results? Will the resulting statistics be appropriate for the type of sampling methodology as well as the questions to be answered? For example, will data be broken down by geographic or service area? Are there previous survey results that can be referenced as part of a trend analysis?
5. If this is for a performance measure, will this survey be duplicated annually (or more often) to provide ongoing data for performance analysis?

If you have determined that a survey is in fact needed, there are several tasks that must be done. These tasks include:

1. Planning
2. Choosing a sample methodology
3. Performing the sample
4. Preparing the questionnaire
5. Pretesting the questionnaire
6. Hiring and training the interviewer (if necessary)
7. Collecting the data
8. Tabulating the data
9. Analyzing the data
10. Preparing the report

The time needed for a survey varies with the type of survey and the particular situation; though expect it to take longer than you might have originally thought. This may sometimes lead staff to take shortcuts that can invalidate the results and badly mislead the user.

Four types of shortcuts that most often occur are:

1. Failure to use a proper sampling procedure
2. Not pretesting the field procedures
3. Failing to follow up on nonrespondents
4. Inadequate quality control

To be useful for the purposes of performance measurement, ***a statistic need not be exact, but it does need to be sufficiently reliable***; therefore, it is important to understand the limitations of the data and to reduce the corruption of the data as much as possible.

Writing Survey Questions

The questions should not be written until the type of question has been considered. Consideration should be given to the effort that will be needed to code the responses. For example, closed-ended questions are easier to tabulate than open-ended or essay questions. Also, closed-ended questions provide data in immediately usable form.

Forms of Questions

- **Open-ended:** These questions allow the respondent to answer a query in his/her own words. Since the data are difficult to categorize, open-ended questions are more suitable to small surveys.
- **Dichotomous (yes or no):** These permit only answers of "yes," "no," or "no opinion" as acceptable responses. This type of question stimulates a response and does not call for a more precise rating. This form is simple for the respondent. Its danger is that a slight misunderstanding may result in a complete reversal of the true opinion.
- **Ranking questions:** This type of question offers options and asks the respondent to rank from most important to least important, i.e., "How important are these services?" The respondent may be given five options and asked for a ranking. The standard is to rank from 1 for the most important to 5 for the least important.
- **Demographic questions:** These are simply descriptors to establish the category of the individual responding and the organization represented. Examples include gender, age or address. However, don't ask these questions unless they are germane to the data you are trying to collect -- think about what information you really need and limit your questions to that.
- **Checklist questions:** This question simply lists several options and asks the respondent to check those that apply. For instance, "What services would you like to see us offer? Check those that apply." One way of dealing with respondents not familiar with a particular topic query is to include "no opinion" as one of the response alternatives. The disadvantage of this is that people with little or no information may still express an opinion to conceal their lack of knowledge on the subject.
- **Multiple Choice:** The philosophy of this question design is that opinions are held along a graduated scale. These scales, for the purpose of a questionnaire, are usually of 3, 4 or 5 ranks, considered a Likert scale. This form of question is particularly useful if the issue is not clear-cut and the question cannot be answered with a simple yes or no. The range of possible answers must be complete enough to cover the entire range of opinions, and as far as possible, the answers should be mutually exclusive. The analyst must be aware of a common tendency to choose the middle rather than extremes. When using a Likert scale in a questionnaire, great care must be used in the choice of wording. Seemingly innocuous words can be emotion-laden or misinterpreted.

Using Surveys: Non-Response

According to the American Statistical Association, a low response rate produces more questionable results than a small sample since there is no scientifically valid way to infer the characteristics of the population that the nonrespondents represent. **So, rather than simply ignoring the nonrespondents, every attempt should be made to get them to respond to the survey.** While there are other options to address nonresponse, this is your best bet for the most valid response.

Common Mistakes/Pitfalls

The following are mistakes some surveyors make that decrease the effectiveness of the survey:

1. Little thought is given to what information is really being sought and what will be done once the data is gathered. Planning is overlooked in the rush to get the job done.
2. There is no good relationship between the procedures used and the objectives of the study. This may result in failure to get good data or the inability to correlate the data that is obtained.
3. The survey is a fishing expedition. Questions are asked for no good reason. There should be a reason for every question.
4. Questionnaires are used when other data gathering methods would be better. Data might be gathered in less time for lower cost by simple research.
5. There is insufficient attention to developing the items and organization of the form.
6. Too many questions are asked. This makes the form too long and increases the time to complete.

Finding Data Sources

When looking at either how to measure departmental performance or how to analyze and recommend solutions for operational issues, it all starts with developing a question that needs answering. For example, concerning the Pedestrian Safety Initiative, where are the hot spots of collisions involving pedestrians in Montgomery County?

Once the question is known, consider how to answer that question. Basically, how can you get at that answer using the information available? In the case of Pedestrian Safety, there needed to be an assessment of who owned data on traffic collisions, was that data comprehensive, and could we define where the gaps were that either needed to be filled with available data or put a process in place to get that data in the future.

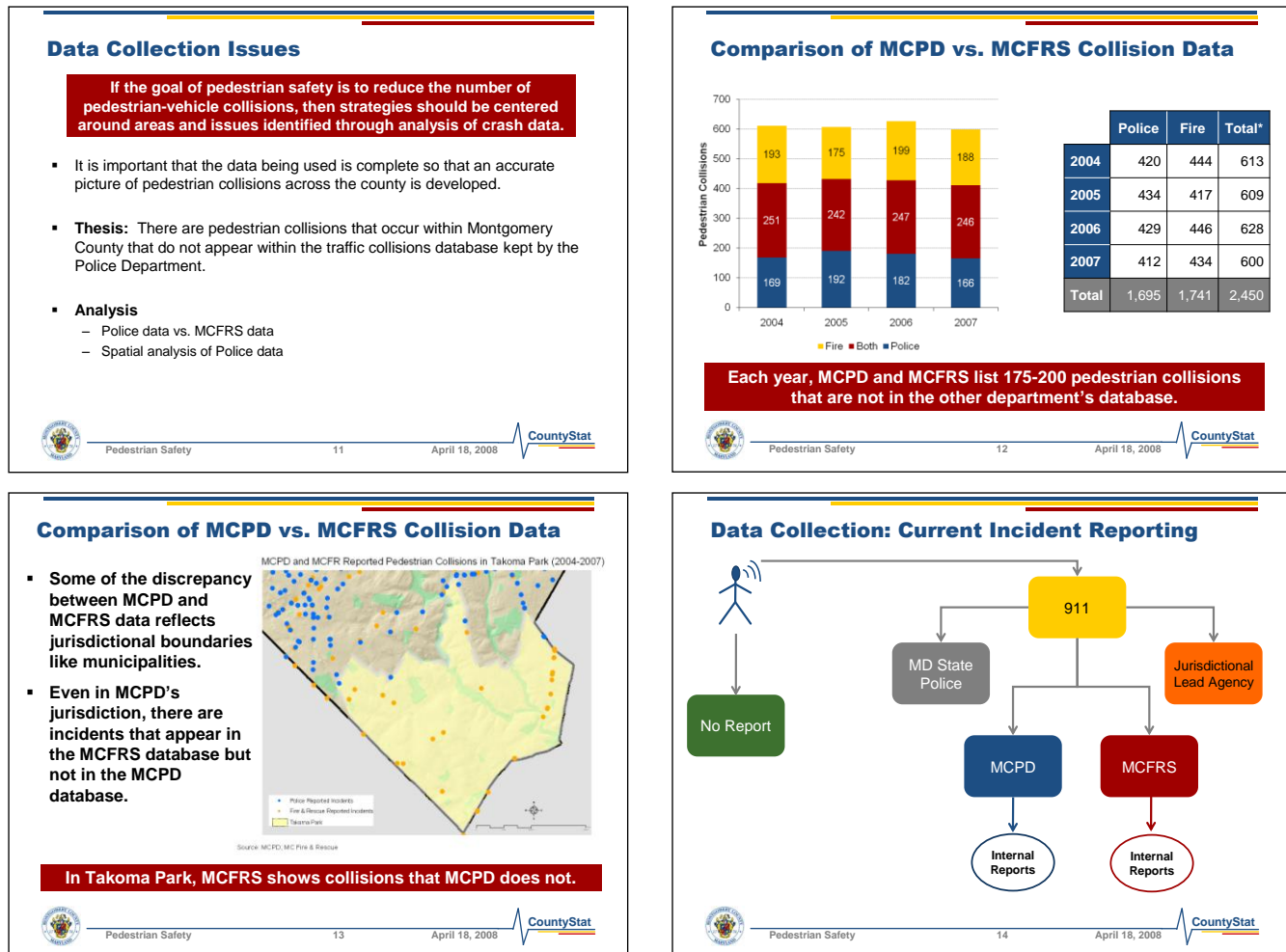
The first place to consult for information is within the Department in question. If they collect the data you need in the manner you need it, then great, your job is much simpler. Likely, this is not the case and there are gaps in the data, either due to data integrity issues or simply due to the past internal data needs of the department.

1. What data does the department currently collect?
2. Is this data reliable?
3. Does it fit what you need to get at the answer to your question?

Even though the Pedestrian Safety Initiative is primarily led by the Department of Transportation (DOT), formerly the Department of Public Works and Transportation (DPWT), they did not collect that sort of information. Instead it was necessary to

reach out to the Police Department for its traffic accident data. Upon assessing this, it was recognized that there were gaps in that data and it was necessary to do some reconciliation with data from the Fire Department. See the below slides for additional information on how that problem was addressed.

Figure 3 CountyStat Presentation on Pedestrian Safety, 2nd Meeting, 4/18/2008



Data Integrity

Data integrity refers to the validity of data, ensuring that it is consistent and correct. This is of extreme importance when building useful performance measures, with the goal of being able to make informed decisions about departmental performance.

Data integrity can be compromised in several ways:

- Human errors when data is entered
- Errors that occur when data is transmitted from one computer to another (or one person to another)

- Errors attributable to technological factors (software bugs or viruses, hardware malfunctions or disk crashes).

When assessing data integrity and quality with respect to performance measure data, several dimensions should be considered:

- *Validity*-How well does the data represent actual performance?
- *Completeness*-How many of the data elements were able to be collected from a sufficient portion of the target population or sample?
- *Accuracy*-To what extent is the data free from major errors?
- *Consistency*-How much of the data was collected using the same procedures and definitions across collectors and times?
- *Timeliness*-Is data about recent performance available when needed to improve operational management and to report to the CAO and/or the public?
- *Ease of Use*-How easily can users access data? (This is assisted by clear definitions, user-friendly software, and easily used access procedures.)

(Divorski and Scheirer, *Evaluation and Program Planning*, 2001)

Data Integrity: Documentation of Source Material

When gathering performance measure data, there are certain additional pieces of information that should be collected and questions asked of department and program contacts in order to build a complete picture of the measure and to test its veracity. While these may not be items displayed in a presentation, they are definitely items with which there may be questions.

Define the data: The data definitions must be developed, identifying the attributes to be included *as well as those to be excluded* from the reporting system.

Document the process: At a minimum, a methodological outline should be developed which identifies how the data will be collected. For example, if the organization intends to obtain customer feedback at the point of service through comment cards, then there should be a record of where the cards are posted, the volume that are printed, and the number returned by customers.

Document data sources: Whether the data are obtained from manual logs, check sheets, computer databases, surveys, or focus groups, it is critical to maintain a record of the source. This step is important because of staff turnover and/or reassignment of duties. Not documenting data sources makes the process vulnerable to inconsistency and inaccuracy in reporting data. In addition, data sources should be reviewed – at least annually – to ensure that a key data source has not been overlooked. For example, an economic development program may have an incomplete list of the businesses it serves. If missing data is a major problem, the program may need to modify its record-keeping process. Also, it is important to ensure that data sources, databases and recordkeeping are maintained in a manner that protects the privacy of client information.

Frequency of Data Collection: The more frequently data are reviewed, the greater the opportunity to improve current processes and overall effectiveness. A key consideration is how

often data will be collected and entered into a central system. Daily? Weekly? Monthly? Quarterly? This factor will help to remind data collectors of when information should be processed.

Data Manipulation: The design should explain how data have been manipulated to create the reported results (i.e., cost per vaccine is the calculation of the total cost of vaccines divided by the total number of vaccinations administered annually). The term “manipulation” used here does not imply the data are being doctored to present a skewed picture. Rather, the term refers to the calculation or methodology used to determine a numerical relationship.

Explanatory Factors (the “Story behind the performance”): Any contextual or procedural information should be recorded as an explanatory factor. For example, outliers (extreme points well outside the range of the other data) are typically excluded to prevent a misrepresentation of the data collection effort. Where assumptions are made, there is always the possibility of misinterpretation of the data. Therefore, assumptions should also be included in the explanatory factors. Finally, any factors beyond the departments’ control that influence program outcomes should also be identified and explained.

Note: This can either be noted in the Notes section of the slides or on the slide itself. In particular, an analyst should know when data was received (or pulled from a database), in order to ensure that the most recent information is included and to be able to reconcile departmental data. This way, if there are questions about the data integrity, there will be a clear chain from the source to the analyst to the presentation.

Options for Data Verification and Validation (Divorski and Scheirer, 2001)

<p><u>Fostering organizational commitment and capacity for data quality</u></p> <ol style="list-style-type: none"> 1. Communicate support for quality data 2. Review organizational capacities and procedures for data collection and use 3. Facilitate agency wide coordination and cooperation 4. Assign clear responsibilities for data 5. Adopt mechanisms that encourage objectivity and independence in data collection and management 6. Provide training and guidance for needed skills and knowledge 	<p><u>Assessing the quality of existing data</u></p> <ol style="list-style-type: none"> 1. Build data quality assessment into normal work processes 2. Use feedback from data users and other stakeholders 3. Compare with other sources of similar data or program evaluations 4. Obtain verification by independent parties, including the Office of the Inspector General
<p><u>Responding to data limitations</u></p> <ol style="list-style-type: none"> 1. Report limitations and their implications for assessing performance 2. Adjust or supplement problematic data 3. Use multiple data sources, with offsetting strengths and limitations 4. Improve the measure by using another source or new measurement methods 	<p><u>Building quality into performance data development</u></p> <ol style="list-style-type: none"> 1. Use prior research or analysis to identify data elements that adequately represent the performance to be measured 2. Gain agreement among stakeholders about a set of measures that are valid for their intended uses 3. Plan, document, and implement the details of the data collection and reporting systems 4. Provide training and quality control supervision for all staff who input data 5. Use analytic methods appropriate for the data type and measure being reported

Data Analysis: Using Excel

Section Objectives

- Implement basic statistical concepts.
- Identify elements of Excel user interface.
- Manipulate the spreadsheet view using freeze panes and/or hide columns/rows.
- Format worksheets.
- Manipulate data in Excel worksheet.
- Use formulas and functions to make calculations.
- Sort data.
- Use Pivot table to categorize and summarize data.
- Use a Look-up table.
- Use if statement and more advanced formulas to conduct data analysis.
- Use data in a spreadsheet to create a chart.
- Describe difference between bar and line charts, and when each is appropriate.
- Use chart wizard options to manipulate and format a chart.
- Know questions to ask when analyzing chart trends.

This section will provide an overview of basic statistical concepts. Then it will then move into a more in depth discussion of using Excel as a data analysis tool and it will provide how-tos for the most commonly used techniques in the CountyStat office.

Excel is an extremely useful data organization, summarization, and analysis tool and its full potential in these capacities are rarely tapped.

There are several techniques that can make these data organization, summarization, and analysis simpler and even more automated, leaving more time and resources for critical appraisal of data points and connecting analyses to operational realities.

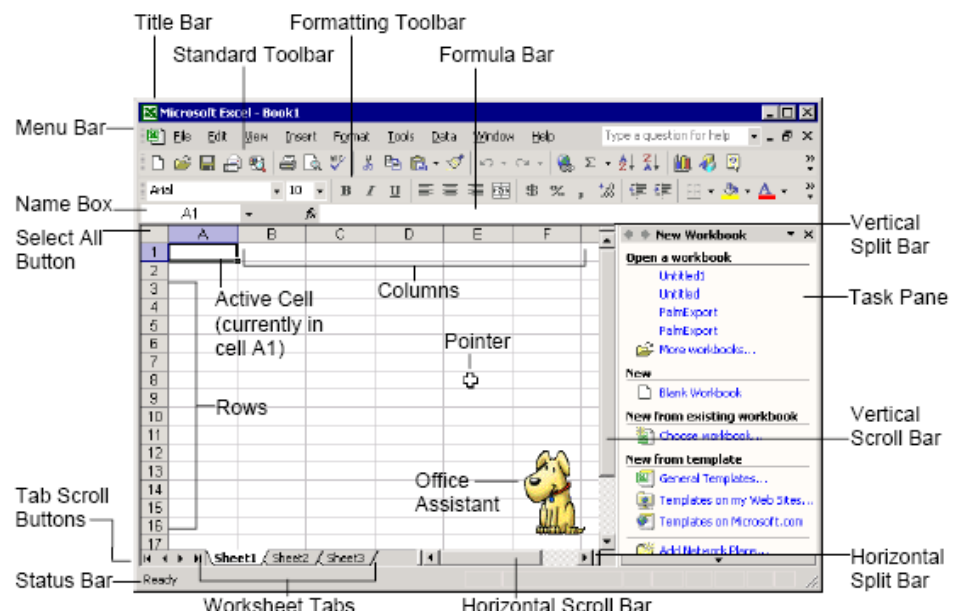


Figure 4 Microsoft Excel 2002 Screen

Excel is set up similarly to other Microsoft applications; however there are features particular to it that are important to note. Excel is set up as a series of spreadsheets, with columns and rows,

each with a particular “cell reference” letter and number (ie. A1). Each individual data point, either text or numeric, is contained in one cell. When the cell is selected, the formula or value in that cell is also displayed in the formula bar.

Basic Statistical Concepts

This section will touch on some key ideas important to data analysis and performance measurement. By understanding them, you will be better equipped to critically examine departmental performance measures, and delve more deeply into improving operational efficiency.

Variable – This is a single characteristic of any object or event. Data sets can contain multiple variables; for example, payroll data contains many variables, both quantitative and qualitative.

- **Quantitative variables** are values that come in meaningful numbers and can include age, weight, and annual income. In the example below, quantitative variables would be Hours Worked and Hours of Annual Leave.
- **Qualitative variables** are values that fall into some category indicating a quality or property of an object, such as gender and ethnicity, and in the below example, department.

Examples of Variables

ID Number	Department	Hours Worked In a Single Pay Period	Hours of Annual Leave
123456789	HHS	80	0
987654321	HHS	80	0
246810121	HHS	60	20
135791113	HHS	75	5

Descriptive Statistics: Various tools are used to summarize the values of a data set; this allows us to take data that may have a large amount of observations (payroll data, for example) and reduce it to a few calculated values. (These values are easily calculated in Excel.) Some of these types of values are listed below:

Measures of Center: One way to summarize a data set is to summarize the contents into a single value that could be thought of as the most typical or most representative value. There are two primary ways to represent this value.

Median: This essentially is the 50th percentile; it represents the middle of the distribution, half of the values are less than the median and half are greater than the distribution. How this is calculated depends on the number of observations. With an odd number of values, the median is the middle number; if there is an even number of values then the median is the sum of the two middle values divided by two.

Excel Formula
=median(number 1,
number 2...)

Mean: This is the average, the sum of all values divided by the number of observations.

Excel Formula
=average(number 1,
number 2...)

Considering we have these two ways of displaying the most typical value, how do they compare? The *mean is very sensitive to extreme values*, and the median overcomes that by ignoring the magnitude of the upper and lower values. It is important to critically think about which to use and in some cases it is best to display both to analyze the skew.

Measures of Variability: It is important to take into account the variability of the data, which is a measure of how much data values differ from one another (or how widely the data values are spread out around the center.)

Range: This is the simplest way to calculate variability, and is the difference between the maximum value and the minimum value in the distribution. *However, this can be a poor and misleading measure of variability because two distributions can have the same range but be different in their variability.*

Excel Formula
=min(number 1,
number 2...)
=max()

Standard Deviation: This demonstrates how spread out your data is from the center and is the “typical” deviation of values from the average.

Excel Formula
=stdev(number 1,
number 2...)

Correlation: Sometimes it's an advantage to be able to express the strength of a relationship between two variables in a “dimensionless” number that does not depend on scale. The correlation expresses the strength of the relationship on a scale ranging from -1 to 1.

- A positive correlation indicates a strong positive relationship (where an increase in one variable implies an increase in the value of the second variable.)
- A negative correlation indicates that an increase in the first variable signals a decrease in the second variable.
- ***A correlation of zero does not imply that there is no relationship between the two variables; there could be a nonlinear relationship that produces a correlation of zero.*

Correlation versus Causality: Correlation indicates a relationship between two variables without assuming that a change in one *causes* a change in the other. Be careful not to confuse correlation with cause and effect (or causality).

Correlation Coefficient: (Pearson's correlation) A value between -1 and 1 that indicates the strength of a linear relationship between two variables. This can be expanded into a “correlation matrix” which will test the relationship among multiple variables, rather than just two.

Excel Formula
=correl(array 1, array 2)

Correlation Matrix Example					
	C1	C2	C3	C4	C5
C1	1.000				
C2	0.274	1.000			
C3	-0.134	-0.269	1.000		
C4	0.201	-0.153	0.075	1.000	
C5	-0.129	-0.166	0.278	-0.011	1.000

Figure 5 Correlation Matrix Example



This type of table is called a *correlation matrix*. It lists the variable names (C1-C10) down the first column and across the first row. The diagonal of a correlation matrix (i.e., the numbers that go from the upper left corner to the lower right) always consists of ones. That's because these are the correlations between each variable and itself (and a variable is always perfectly correlated with itself).

You can definitely go beyond these basic concepts when applying statistical data analysis to your data set, but these will take you a long way in deriving meaningful information on performance from your department's data. Now that these concepts have been introduced, the next section will go into more detail on how to use Excel to your advantage.

Worksheet Formatting

Sometimes it is useful to hide certain sections of data from view, either for data entry purposes or to draw attention to specific rows or columns of data.

Display or hide rows or columns

1. Display a hidden row or column
 - Select a row or column on each side of the hidden rows or columns you want to display.
 - On the *Format* menu, point to *Row* or *Column*, and then click *Unhide*.
 - i. If the first row or column of a worksheet is hidden, click *Go To* on the *Edit* menu. Type A1 in the Reference box, and click OK. Point to *Row* or *Column* on the *Format* menu, and then click *Unhide*.
 - ii. Also, the row or column may have had the height or width set to zero. Point to the border of *Select All* until the cursor changes to  or , and drag to widen the row or column.
2. Hide columns or rows
 - Select the row or column you want to hide.
 - On the *Format* menu, point to *Row* or *Column*, and then click *Hide*.

Additionally, when entering data, or viewing a worksheet by freezing or splitting the spreadsheet pane, a user can see two distinct sections of the spreadsheet. This is especially useful when scrolling through a long list of data points; it allows the user to retain the row and column labels in view.

View two parts of a sheet by freezing panes

Freeze panes: Freezing panes allows you to select data that remains visible when scrolling in a sheet. For example, keeping row and column labels visible as you scroll.

1. To freeze a pane, do one of the following:
 - The top horizontal pane: Select the row below where you want the split to appear.
 - The left vertical pane: Select the column to the right of where you want the split to appear.
 - Both the upper and left panes: Click the cell below and to the right of where you want the split to appear.
2. On the Window menu, click Freeze Panes.

Manipulating Data

Sorting

Data is often entered on the sheet in an order that is awkward for answering certain questions. In fact, you may need to look at the same data in different ways at different times. Sorting can help rearrange your data so you can use it more efficiently.

Note: If your rows contain a formula, you must be extra careful when constructing the formula. Be sure that after a Sort, the formula will still work. Moving cells around can destroy some formulas.



Buttons: Sort Ascending and Sort Descending buttons allows you to sort in regular alphabetic order and in reverse order. You can sort whole rows

("Expand the selection") or sort just selected cells, based on the first column of the selection. Of course, if your data consists of rows of related facts, sorting by whole rows is safer.

Dialog Box: The *Sort dialog* is more flexible than sorting with the toolbar buttons. The dialog allows you to select which column(s) to use as the basis of the Sort.

You can set three levels of Sort. Excel will first sort all the selected rows based on the first column you chose. Then Excel sorts rows that all had the same value in that first Sort column, using the second column you chose. Finally Excel sort rows that had the same first and second sort column values, using the third column you chose.

Custom List: You can also create your own *Custom List* under *Tools / Options / Custom Lists* when the order you wish to sort by is neither alphabetic nor reverse alphabetic.

Figure 6 Microsoft Excel Sort Dialog Box



Formulas and Functions



Writing formulas in Excel can be one of its most useful features, allowing the user to do everything from simple mathematical operations to complex calculations relying on conditional statements.

Basics

Excel formulas start with the equal sign (=) rather than ending with it. The equal sign always goes in the cell where you want the formula answer to appear. The equal sign informs Excel that what follows is part of a formula, and not just a name or a number.

Excel formulas look like this: =3 + 2

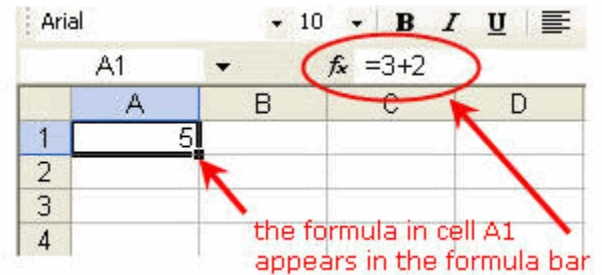


Figure 7 Microsoft Excel: Writing Formulas

Cell References in Formulas

While the formula in the previous step works, it has one drawback. If you want to change the data being calculated you need to edit or rewrite the formula. A better way would be to write formulas so that you can change the data without having to change the formulas themselves.

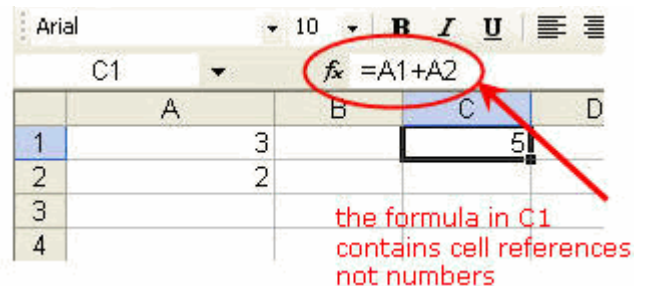


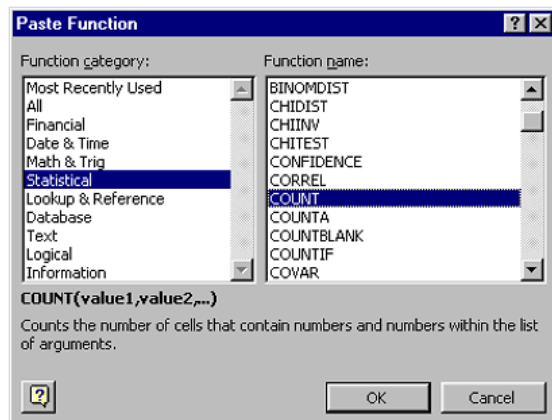
Figure 8 Microsoft Excel: Writing Formulas Using References

To do this, you need to tell Excel which cell the data is located in. A cell's location in the spreadsheet is referred to as its *cell reference*. To find a cell reference, simply look at the column headings to find which column the cell is in, and across to find which row it is in. When writing cell references the column letter always comes first.

So, instead of writing this formula in cell C1: = 3 + 2 write this instead: = A1+A2

The cell reference is a combination of the column letter and row number -- such as A1, B3, or Z345.

Figure 9 Microsoft Excel: Choosing a Function



The best aspect of this is that if the data in A1 changes, the result of the formula will automatically update to reflect that change.

Moving on from the Basics

The best way to learn new formulas is to use the Insert Function button. Click into an empty cell and click on the **fx** button. If you know what type of function you are looking for, you can select the category and all the functions within that category will be listed.

However, if you don't know what category you need, you can select "All" in the category list and

all of Excel's functions will be listed. Notice as you click on any function name, Excel displays a description of what that function does below the boxes.

For example, select the "Lookup & Reference" category and scroll down to select the VLOOKUP function. Note that it tells you that this function "searches for a value in the leftmost column of a table and returns a value from the same row in that table based on what column in that row you specify."

Advanced Formulas (Conditional Statements)

In a nutshell, the IF statement answers the question, "Is this true or false?", and then proceeds on some action based on this. For example, is the value in column A larger than the value in column B? While the instructions below explain how implement this, it is definitely a tool that requires practice to use correctly.

The arguments in an If statement are as follows:

Logical test – What are we asking? In this case, let's say our logical test is "Is the value in Column A larger than the value in Column B?"

Value if true – What do we want displayed if the answer to our question is "true"? In this example, let's say we want the answer to be "yes"

Value if false – What do we want displayed if the answer is "false"? In this example, let's say we want "no".

In a formula, the arguments are separated by commas, so for this example, let's put our formula in cell C2 and this is what it would look like: **=IF(A2>B2,"yes","no")** This says, IF the value in A2 is greater than the value in B2, put yes in C2 and if it's not greater than B2, put no in C2.

NOTE: When you want text displayed in a cell, you must put the text in quotes in the formula.

Absolute Reference:

\$D\$2

The dollar sign is in the reference to D2. This is because we want this formula to ALWAYS refer to cell D2, no matter where we copy the formula to. *The dollar signs make the cell reference absolute.*

You can put pretty much anything you like in the second two arguments. You can put text or a number. You can also tell Excel to leave the cell empty by using two quotes as your argument (""). Let's say we want "yes" if it's true, but if it's false, we want the cell left empty. Then our formula would look like this: **=IF(A2>B2,"yes","")**

You can do all kinds of things with text in IF statements.

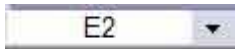
Let's say that we are evaluating salespeople in order to see if they should get a raise or be fired. If last year's sales are in A2 and this year's sales are in B2, we can use an IF statement in C2 that says this: **=IF(A2>B2,"contact this salesperson","give this one a raise")**

Or, we can put cell references in the second two arguments. For example, if we want the value if false to be something that is in another cell, we can just put that cell name in the third argument. Let's say, cell D2 contains a bonus amount, we could use this formula: **=IF(A2>B2,"contact this salesperson",\$D\$2)**

Naming a Range

Naming ranges in Excel can save you lots of time and repetitive work. Let's say you have a range of cells that you are including in many different formulas or you have a block of cells that you are using a lot to produce various charts and/or pivot tables. If you name the range, you can easily select that range anytime you need it. Using a named range in a formula also negates the need to make the range an absolute reference because it will always point to the correct range, no matter where you copy the formula.

To do this, let's say we want to name the range of cells that include the number of program participants.

- First, highlight the cells.
- Click inside the "Name" box on your toolbar at the top of your screen. It will be on the left end and looks like this: 
 - When you click inside this box, you see the cell name (E2) is highlighted and shoots to the left of the box. While it's highlighted, whatever you type will replace what's in there, so just type amount then hit your Enter key.

NOTE: You must hit the Enter key when you are finished typing the name so it is accepted. You can tell it's been accepted when it centers in the box.

Pivot Tables

One of the most powerful features of Microsoft Excel is the Pivot Table. Pivot tables allow rapid, dynamic, flexible data analysis. A pivot table is a great reporting tool that sorts and sums independent of the original data layout in the spreadsheet

1. To begin, you first need raw data to work with. The general rule is you need more than two criteria of data to work with—otherwise you have nothing to pivot. PivotTables are especially well-suited for taking enormous amounts of data and summarizing that data into useful reports.

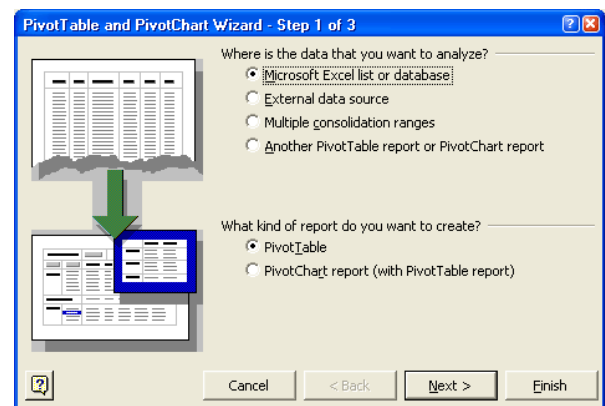


Figure 10 Microsoft Excel: Pivot Table Wizard

General Guidelines for Pivot Table Raw Data

Use Headings: As in this example, the first row must have headings. Use a different heading for each column.

Keep It Together: Keep all the data together -- don't include any blank rows or columns in the table.

Isolate It: Leave at least one blank row and one blank column between the data table and any other information on the worksheet.

- To create a PivotTable, place the cursor anywhere in the data area (assuming the data is contiguous), and then start the PivotTable wizard from the data menu as shown below. The PivotTable wizard will walk you through the process of creating an initial PivotTable.
- While there are many advanced options available to use, simply click the Finish button to create a quick PivotTable. The results are that Excel creates a blank PivotTable, and the user must then drag and drop the various fields from the PivotTable field list onto the appropriate column, row, or data section. As you drag and drop these items, the resulting report is displayed "on the fly."

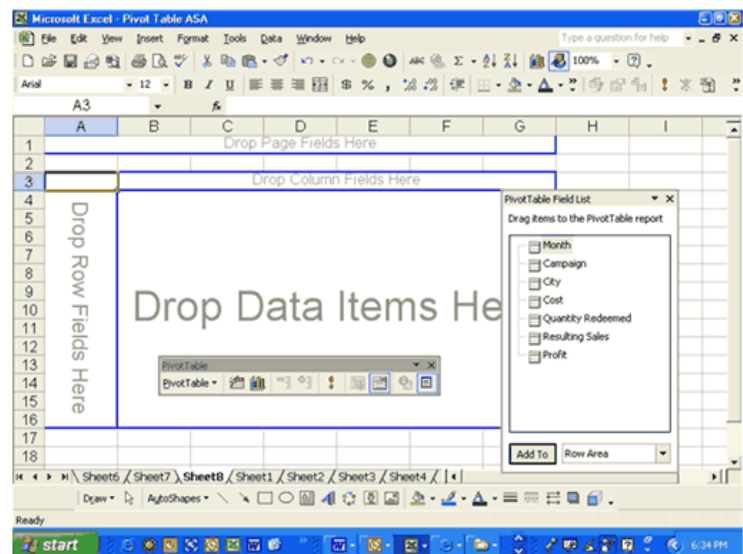


Figure 11 Microsoft Excel: Blank Pivot Table

Pivot Tables can be modified to display different results such as averages, counts, minimums, maximums, etc.

Look-Up Tables

The *VLOOKUP* function is a handy one to know when you want Excel to lookup a value in one place and insert it in another. This is particularly if you have a master list to start with and want to look up values to populate another list.

For example, let's say you have a list of all of your customers on a sheet named "Accounts" and an invoice on another sheet named "Invoice". When you type in their account number on the Invoice, you want Excel to fill in the name of the customer and their address (and this information is included for all customers on the Accounts sheet). A *VLOOKUP* will do this for you.

VLOOKUP(lookup_value,table_array,col_index_num,range_lookup)

- Click in the cell where you want to place the looked-up value and click **fx** on the formula bar. Once you click OK, you will get the Function Wizard which helps you with your *VLOOKUP* formula. Notice at the bottom of this box, it tells you what each box you click inside needs.
- Lookup_value:** is the value to search in the first column of the table array.

- Now, because we will be typing an Account # in cell C2, that is the value we must put in the first box of this wizard which will tell Excel to look for whatever is in C2 in the leftmost column of our lookup table (which we created on the Accounts sheet and named "Customers"). So, enter C2 into the top box.

- Table_array:** Two or more columns of data. Use a reference to a range or a range name. The values in the first column of table_array are the values searched by lookup_value. This is where we need to identify our table so Excel knows where to look. So, in this box, simply type Customers or highlight the range on the master list.
- Col_index_num:** The column number in table_array from which the matching value must be returned. This one wants to know the number of the column we want returned. *Remember that what you entered in the first box in this wizard must ALWAYS be in the first column of your lookup table.* So, in our table, the Account # is in the first column and the Customer Name is in the second column. Since the customer name is what we want to put here, just type a 2 to let Excel know we want what is in the second column.
- Range_lookup** (optional): Whenever a label in this wizard is not bold, that means this "argument" of the function is not required. However, if you do not enter anything in this box, Excel will apply the default. If you read the instructions at the bottom of this box, you will see that the default for this box is "true" which will find the "closest match", whereas "false" will find an "exact match". Since we want an exact match, type false in this box.

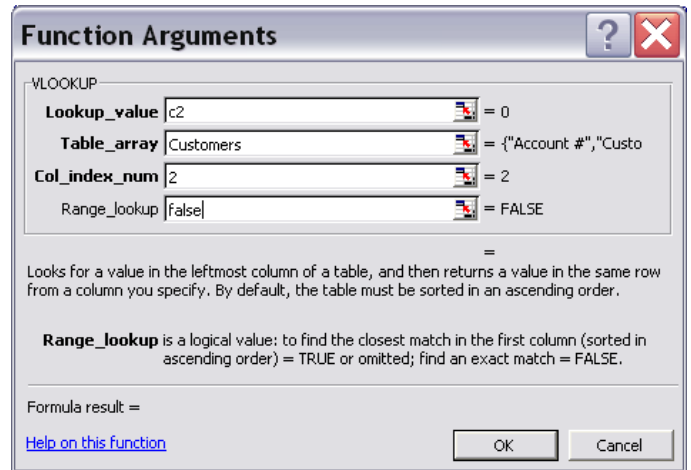


Figure 12 Microsoft Excel: Formula Dialog Box – VLOOKUP

Charts

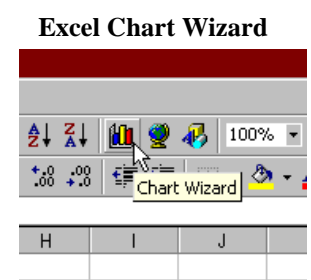
Charting is all about displaying data in a way that can be easily interpreted.

The first step is to select the data to be charted. To facilitate this, make sure:

- The data is laid out in rows and columns in a contiguous worksheet range
- The data has a header row with text labels describing the columns
- The data has a header column of categories describing the rows
- The upper left cell of the data range is blank

The **Chart Wizard** can be started by using the **Chart Wizard** button on the Standard command bar (left) or from the **Chart** button on the **Insert** menu. The data can be selected prior to running the chart wizard, filled in while running the chart wizard, or added to the chart later. The Chart Wizard runs through a series of steps that help you set up your chart.

After selecting the data, you must select the type of chart. Excel provides



many options, but for the most part bar and line charts provide most of what you need to accurately display data in a way that is informative and easy to interpret.

Bar Charts

Bar Charts are useful for comparing classes or groups of data. In bar charts, a class or group can have a single category of data, or they can be broken down further into multiple categories for greater depth of analysis.

Line Charts

Line Charts are useful when an item is repeatedly measured, to show changes across time, and when measuring several different items which can be shown on the same scale, to show how they change relative to one another.

In addition, line charts can be used when measuring progress towards a goal, to show the relative improvement. Use it, rather than a Bar Chart, to show *continuous* change, rather than discrete measurements. It is also better when there are many measurements.

Tips when creating a chart

- Keep in mind the message you want to get across, don't be distracted by all the data at your disposal or all the fancy chart types Excel provides.
- Try to avoid 3-D style charts, because these styles can truly distort the data. The 3D effects introduce parallax that make it hard for the reader to judge the values being plotted, even with pencil and ruler on a hard copy. 3D pie charts become elliptical, so that it is hard to judge the relative size of the wedges. In the sample shown here, all five wedges are the same size.
- Keep It Simple. Don't make a chart too cluttered. Limit the number of series and categories. Make labels clear and concise. Maybe two simpler charts will be clearer than one complex chart.

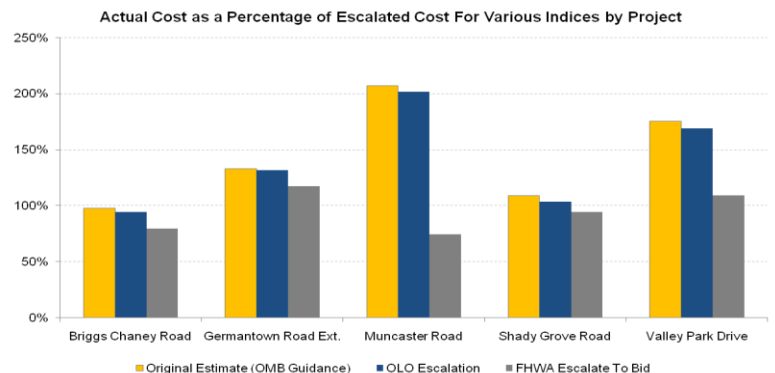


Figure 13 Bar Chart Example - CountyStat CIP Presentation

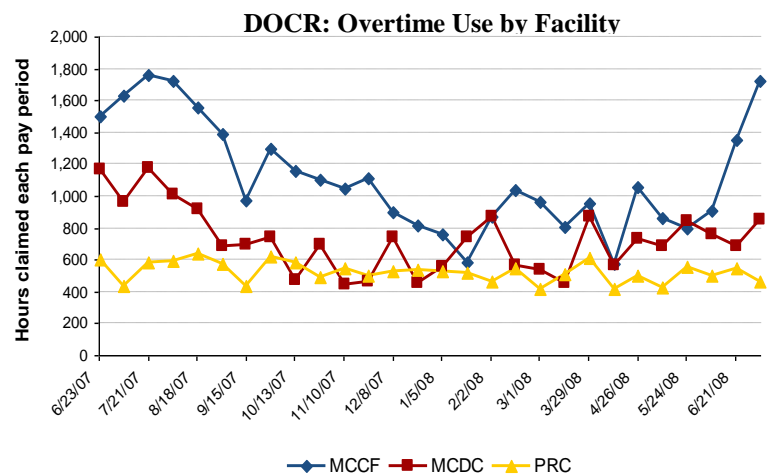
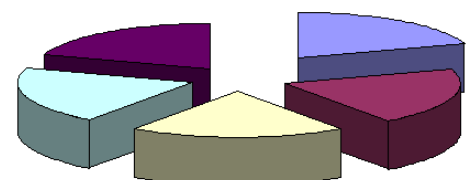


Figure 14 Line Chart Example - CountyStat Overtime Presentation



3-D Pie Chart

- Know your audience. A roomful of engineers will understand a log scale axis without any problem and could probably handle greater complexity in a chart. If the chart is in a prospectus for potential investors, it should have only a few series and categories, and labels should be short and free of jargon and acronyms.
- Two simple charts might be more informative than one. Two charts can get across paired ideas with less clutter than one complex combination chart. On the other hand, combining data onto a single chart may have advantages: rather than placing four pie charts on a page, a stacked bar chart allows easier comparison among several categories.

Axes and Scale

When creating a chart from data, it is important to be aware of the x and y axes and the scale of each. Make sure to label the axes accurately. Start the y-axis at zero to avoid confusion when interpreting the graph. Choose a reasonable scale that is small enough shows change over time, but large enough not to clutter the axis.

Secondary Axes

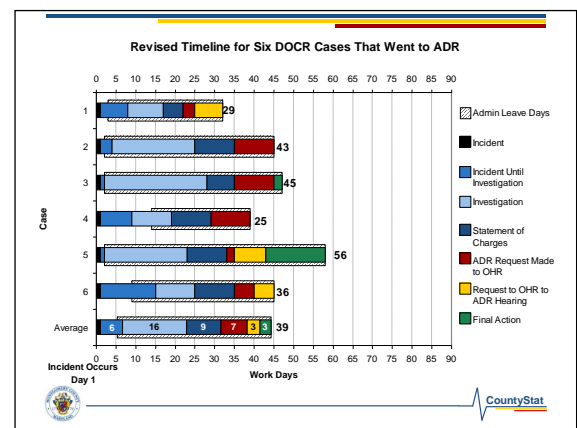
When the range of values for different data series in a 2-D chart varies widely, or when you have mixed types of data (such as price and volume), you can plot one or more data series on a secondary value (y) axis. The scale of the secondary axis reflects the values for the associated series.

1. Click the data series you want to plot along a secondary value axis.
2. On the **Format** menu, click **Selected Data Series**, and then click the **Axis** tab.
3. Click **Secondary axis**.

Comparing Apples to Apples

When making comparisons between two data points, it is key to make sure you are not comparing apples to oranges, but are in fact comparing apples to apples. What this means is that when analyzing data, and especially when comparing two sets of data, you must check to make sure it is a valid comparison. Check the baseline. Check the units.

Figure 15 Example of a Secondary Axis



3. **The Model View:** A GIS is a set of information transformation tools that derive new geographic datasets from existing datasets. These geoprocessing functions take information from existing datasets, apply analytic functions, and write results into new derived datasets. → [Learn more.](#)

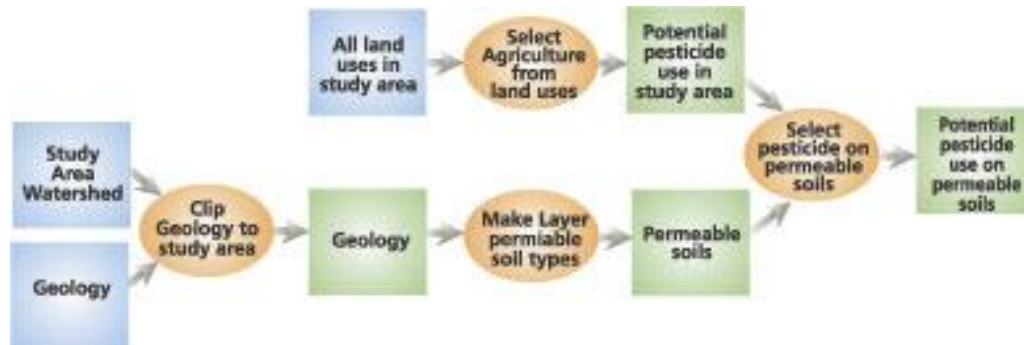


Figure 18 GIS - The Model View

What Can You Do with GIS?

Map Where Things Are

Mapping where things are lets you find places that have the features you're looking for, and to see where to take action.

1. Find a feature—People use maps to see where or what an individual feature is.
2. Finding patterns—Looking at the distribution of features on the map instead of just an individual feature, you can see patterns emerge.

Map Quantities

People map quantities, like where the most and least of something is, to find places that meet their criteria and take action, or to see the relationships between places. This gives an additional level of information beyond simply mapping the locations of features.

This map shows the number of children under 18 per clinically active pediatrician for a particular study area. It was created by the Center for the Evaluative Clinical Sciences at Dartmouth Medical School as part of an effort to develop a national U.S. database of primary care resources and health services.



Figure 19 Map of the number of children under 18 per pediatrician in the study area

For example, a catalog company selling children's clothes would want to find ZIP Codes not only around their store, but those ZIP Codes with many young families with relatively high income. Or, public health officials might not only want to map physicians, but also map the numbers of physicians per 1,000 people in each census tract to see which areas are adequately served, and which are not.

Map Densities

While you can see concentrations by simply mapping the locations of features, in areas with many features it may be difficult to see which areas have a higher concentration than others. A density map lets you measure the number of features using a uniform areal unit, such as acres or square miles, so you can clearly see the distribution.

Mapping density is especially useful when mapping areas, such as census tracts or counties, which vary greatly in size. On maps showing the number of people per census tract, the larger tracts might have more people than smaller ones. But some smaller tracts might have more people per square mile—a higher density.

Find What's Inside

Use GIS to monitor what's happening and to take specific action by mapping what's inside a specific area. For example, a district attorney would monitor drug-related arrests to find out if an arrest is within 1,000 feet of a school—if so, stiffer penalties apply.

This image from The Sanborn Map Company, Inc., shows a geoprocesed sample explosion radius around an area in California. Each separate zone represents 1/4-mile, the outermost perimeter being 1 mile away from the source.



Figure 20: Image from The Sanborn Map Company, Inc

Find What's Nearby

Find out what's occurring within a set distance of a feature by mapping what's nearby.

For the Pedestrian Safety Initiative it was important to determine if lighting was indeed a factor in collisions occurring at the intersection of Wisteria and Great Seneca Highway. By mapping the collisions and street lights a determination can be made that lighting was not a factor in this particular intersection.

Map Change

Map the change in an area to anticipate future conditions, decide on a course of action, or to evaluate the results of an action or policy.

1. By mapping where and how things move over a period of time, you can gain insight into how they behave. For example, a crime analyst might study the distribution of burglaries over time and determine if vacant properties influences this pattern. .

2. Map change to anticipate future needs. For example, a police chief might study how crime patterns change from month to month to help decide where officers should be assigned.
3. Map conditions before and after an action or event to see the impact. A retail analyst might map the change in store sales before and after a regional ad campaign to see where the ads were most effective.

Answering Questions with GIS

GIS is fundamentally used to answer questions and make decisions. To use GIS properly, it is important to know what you want to ask and follow a disciplined process for getting the answer.

1. Frame the question.

Start your GIS analysis by figuring out what information you need. This is most often in the form of a question:

- Where were most of the burglaries last month?
- How much forest is in each watershed?
- Which parcels are within 500 feet of this liquor store?
- Be as specific as possible about the question you want to answer. This will help you decide how to approach the analysis, which method to use, and how to present the results.

2. Select your data.

The type of data and features you work with help determine the method you use. Or, if you know you need to use a specific method to answer your question, you may find you need additional data.

Data can come from any number of sources—databases within your organization, contact managers, CAD files, the Internet, commercial data providers, government organizations, and so on.

The data you choose and where you get it depends on your needs and budget. Most critical is that the data be good quality, accurate data.

This water utility map shows five sets of data: parcels, building footprints, grid lines, streets, and pipes color coded by replacement status. Only the data necessary for understanding pipe locations and status was displayed.



Figure 21: Water Utility Map

3. Choose an analysis method.

Decide which analysis method to use based on your original question and how the results of the analysis will be used.

For example, if you are doing a quick study of burglaries in a city to look for patterns, you might just map the individual crimes and look at the maps. If the information will be used as evidence in a trial, however, you might want a more precise measure of the locations and numbers of assaults for a given time period.

4. Process the data.

Once you've selected the analysis method, you'll need to process your data in a way that makes sense for your goal.

If you are mapping where things are located, you may need to assign geographic coordinates, such as latitude and longitude or address, to your data and assign category values to the data.

If you are mapping quantities, such as number of pedestrian collisions, you may need to choose a classification scheme and decide on how many classes to represent your data.

If you are trying to find out what is inside, you may need to measure an area or combine different layers of information.

5. Look at the results.

The final step is to look at the results of your analysis and take action based on those results.

Your results can be displayed as a digital map, printed as a paper map, combined with spreadsheet-like tables or charts, or displayed as such. Though a lot of emphasis in GIS is in making maps, the software is flexible enough to allow you to display your results in the format that best suits your needs.

This map was created to show that street lighting was not a factor for pedestrian safety in this area of the county.

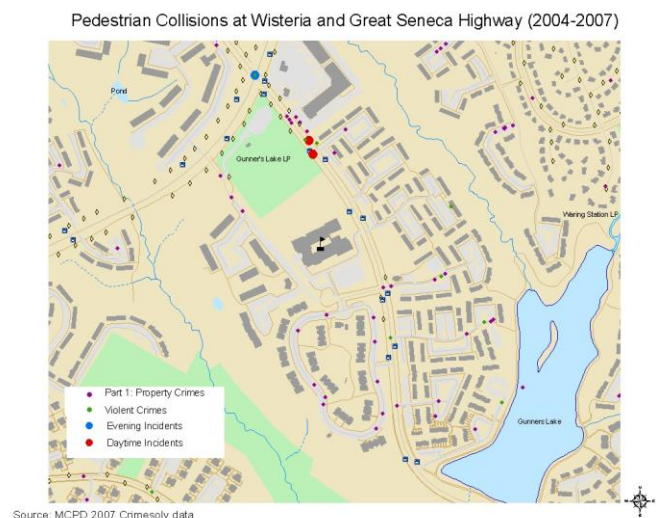


Figure 22

Steps to Data Processing and Scrubbing for a Successful GeoCoding Experience

What is Geocoding?

“The process of finding the location of a street address on a map. The location can be an x,y coordinate or a feature such as a street segment, postal delivery location, or building. In GIS, geocoding requires a reference dataset that contains address attributes for the geographic features in the area of interest.” (*GIS Dictionary - ESRI Support*, Accessed: July 1, 2005)

HOW TO GEOCODE

1. Create a table of the addresses to be geocoded in Excel. You'll want four columns: Address, City, State, and Zip- you may also want another column, such as a Name or ID column.
 - The above column headings are used throughout these instructions. If you choose to use different column headings, make sure they do not contain spaces (Street_Address rather than Street Address). If there are spaces in the column headings, the data cannot be added to ArcMap. Here is an example of how the data should look:

Address	City	State	Zip
720 Franklin St.	Chapel Hill	NC	27516

2. In Excel, save the file as a .CSV file, and then open it in ArcMap. Select File -> Save as. Provide a file name and choose ".CSV" from the "Save as type:" drop-down box at the bottom. You will get a dialog box that says "filename.csv may contain features that are not compatible with Text (Tab delimited). Do you want to keep the workbook in this format?" (CSV only supports one worksheet, so if you have multiple ones you will need to split them into different files. You will also lose any formulas you may have.) Click Yes.
3. Close the file in Excel. When you attempt to close the file you will get another dialog box, with the following message: "Do you want to save the changes you made to 'filename.csv'?" Click No. You already did that in step 2.
4. Open ArcMap.
5. Add the filename.csv file to ArcMap just as you would spatial data, (File -> Add Data or use the Add Data button).
6. After bringing the address table into ArcMap, open it and check it to make sure it came over ok.
7. Add an Address Locator:

An address locator "defines the process for translating nonspatial descriptions of places, such as street addresses, into spatial data that can be displayed as features on a map"

To add an Address Locator, use the Address Locator Manager: From the drop-down menu in ArcMap, select Tools -> Geocoding -> Address Locator Manager. Click the "Add..." button to add the address locator, and navigate to:

Database Connections: MNCPPC's SDE at IP address 10.80.1.8

Select the **GISADMIN. Master Address** address locator and click "Add" (wait a second for the address manager to load). After the **Master Address** Address Locator is listed in the Address Locator Manager, click Close.
8. Now that you've selected an address locator, you are ready to Geocode. From the drop-down menu in ArcMap, select Tools -> Geocoding -> Geocode Addresses. Select the **StreetMap USA** address locator to use, then click OK. Geocode the addresses in the table you added.

Make sure the table is selected in the Address table: drop-down menu.

Make sure the Address Input Fields Match those below:

Street or Intersection: Address

City: City

State Abbreviation: State

Zip: Zip

9. After the geocoding process is complete, a "Review/Rematch" window will be returned that contains a summary of the results. If you'd like, rematch any addresses that did not match interactively by clicking on the "Interactive Rematch" button. Alternatively, you could modify the geocoding options (change the default settings), and rematch automatically by selecting the "Match Automatically" button. More Geocoding Hints are outlined below

GEOCODING TIPS

1. Do Not Include a Title in the Spreadsheet
2. Each Field should have no more than 10 characters and should start with a Letter
3. Each Column needs to be formatted as text, date, general, or number
4. If you want to keep in leading zeros you need to format the column as text
5. Create a new first column called ID and number each row from 0 upwards
6. Make sure all your data is on one sheet and delete other sheets.
7. Save it as a .CSV comma delimited file
8. Delete subtotal rows and blank rows
9. Be cautious when rematching your address data! An unmatched address is much better than an incorrectly matched address.
10. P.O. Box addresses will not geocode to a street location - the closest geocoding option for a P.O. Box is ZIP Code.
11. Geocoded locations may not be very accurate. They are approximations based on street data. At best, they are as accurate as the street data.
12. Giving a street the wrong suffix or street type, like "Court" instead of "Avenue," or providing no suffix when there are multiple streets with the same name in the database, will cause errors. Misspelled street names or street names not in the database can also cause errors, although the software will try to match abbreviations and account for possible misspellings. This can be adjusted in the Geocoding Options window. It is also possible that there are errors or outdated information within the street database itself that could cause additional errors.
13. When using the Centerline as the Address Locator Street addresses are estimated along block faces; therefore, the true locations of the addresses may not be represented. For example, an address with a house number of 50 will be placed exactly halfway along the 0-100 block even though the actual location of the house is not likely to be at the exact midpoint of the street segment. Also, pay close attention to the offset setting (i.e., the distance from the street centerline the addresses will be placed). The offset can be adjusted in the Geocoding Options window.

Below you can see some common errors when trying to geocode addresses. Some of these errors take a little detective work to figure out, while some will not match even after quality control is

performed. The table below demonstrates the necessity of having clean data as an input. Adhering to formatting conventions will make the geocoding process less painful.

Data cleaning & geocoding

First Street	Second Street	Address Match	Status	Score
BETHESDA CHURCH	RIDGE	BETHESDA CHURCH RD & RIDGE RD	M	100
MAIN	RIDGE	MAIN ST & RIDGE RD	M	100
MAIN	WOODFIELD	MAIN ST & WOODFIELD RD	M	85
FATHER HURLEY	WATERS LANDING	FATHER HURLEY BLVD & WATERS LANDING DR	M	100
FREDERICK	SOUTH MALL ENT		U	0
FATHER HURLEY	I-270		U	0
FATHER HURLEY	I-270		U	0
CRYSTAL ROCK	FATHER HURLEY	CRYSTAL ROCK DR & FATHER HURLEY BLVD	M	100
COLUMBIA	BURTONSVILLE CROSSING	15783 COLUMBIA PIK	M	100
FREDERICK	LORAL		U	0
FREDERICK	ODENDHAL	N FREDERICK AVE & ODENDHAL AVE	M	95
LAKE FOREST MALL	MONTGOMERY VILLAGE	LOST KNIFE RD & MONTGOMERY VILLAGE AVE	M	100
CHRISTOPHER	LOST KNIFE	CHRISTOPHER AVE & LOST KNIFE RD	M	100
FREDERICK	SOUTH SUMMIT	S FREDERICK AVE & S SUMMIT AVE	M	100
HITCHING POST	MONROE		U	0
NICHOLSON	WHITE FLINT MALL	5200 NICHOLSON LA	M	38
NEBEL	NICHOLSON	NEBEL ST & NICHOLSON LA	M	100
FIELDS	SHADY GROVE		U	0
SHADY GROVE	SOLID WASTE TRANSFER STA	16101 FREDERICK RD	M	100
CRABBS BRANCH	SHADY GROVE	CRABBS BRANCH WAY & SHADY GROVE RD	M	100
METRO ACCESS SOUTH	SHADY GROVE		U	0
HUNGERFORD	HUNGERFORD PLAZA		U	0



Presentation Title

8

August 8, 2008

FORMATTING CONVENTIONS: For a Successful Geocoding Experience

Street Address Format

Street_# space Street_Name space Street_Suffix space Street_Direction

For Street Suffix the following are accepted

PIK = pike

RD = road

LA = Lane

HWY = Highway

Apartment numbers and letters will not geocode so do not include them in the address identifiers

Intersection Format

Street_# space Street_Name space Street_Suffix space Street_Direction & Street_# space Street_Name space Street_Suffix space Street_Direction

INTRO TO ARCMAP

There are many resources on the web that will walk you through the major functions of the GIS and how to use them. There are slight variations based on the version of the software. The CountyStat office currently is linked by remote desktop to a computer in the DTS/GIS Lab that is running ArcGIS 9.2. This may change in the near future. For an overview of major functions see

Introduction to GIS using ArcGIS (Guide 37 Version 6.1) Durham University Information Technology Services which will highlight the following content.

The ultimate source of information on the newest ArcGIS software versions will always be ESRI. ESRI offers introductory online training courses some of which are free of charge.

Presentation Building

Section Objectives

- Follow the guidelines for constructing for structuring a presentation.
- Understand the common pitfalls of presentation building.
- Use PowerPoint to build a presentation.
- Understand why the CountyStat template is formatted this particular way.
- Construct a graph with the proper formatting and understand why this is the appropriate way to display graphical data.

Presentations are a large part of what CountyStat is responsible for, as it is the focal point for conversations between the CAO, CE and Departmental leadership. Keeping this in mind, it is extremely important to build a presentation that makes connections between ideas (makes sense), gets key points across to the audience, is accurate, and looks good.

Creating a Narrative: Telling the story

A presentation should be a blend of visuals and narrative; it is more than just a speech. By carefully considering its structure and content, the presentation can make the biggest impact on its audience.

Guidelines for structuring a presentation

- Let the audience's need determine structure and content
 - What do you want your audience to do as a result of this presentation? Given that, consider what they need to know. This likely won't be everything you know, so it's up to you to pare that down in order to tell the story.
 - Also, consider the audience's motivation in listening to this presentation. What are they looking for and what preconceived ideas will they bring to the table?
 - *In CountyStat, the audience is typically three-fold: the CAO, the invited department (s) (who is responsible typically for the majority of the content), and visitors, which could include other departments,*

Motivating the Problem

Importance of Overtime in Montgomery County

All Departments should closely monitor overtime to ensure that Montgomery County Residents receive the highest possible return on their tax-dollar investment

- **Overtime is an Indicator of Operational Procedures**
 - Overtime expenditures are impacted by adjusting operational procedures
 - Uncovering the "why" behind overtime statistics allows Departments to promote innovative solutions to operational inefficiency
- **Overtime Assists in the Provision of Services During Times of Need**
 - Departments face extenuating situations when their services are in high demand and require the use of overtime
 - Mandatory overtime is included in collective bargaining agreements
- **Overtime Expenditures Serve as a Barometer of Change**
 - Monitoring overtime prevents employees from working excessive hours that may result in increased sick leave and higher turn-over rates
 - Increased overtime can indicate increased burden on specific Departments and allow the County to realign resources



Overtime

4

May 9, 2008



Goal of Initial CountyStat Involvement: Translate Policy into Operational Performance

- **Define** and identify key aspects of positive youth development across departments.
- **Articulate** an organizational approach and work plan that allows for clear linkage between overall policies and operational realities.
- **Identify** which existing programs should fall under the PYDI.
- **Construct** measures to demonstrate performance of programs associated with positive youth development.
- **Collect** and **report** existing data for analysis.



County agencies (like County Council, MNCPPC, etc.), and County residents.

- Use the introduction to motivate the problem and set up the structure

- Framing the issue being discussed is important to make connections for your audience. What is the problem and why is it important? What is the purpose/objective of the presentation?

- Make use of the agenda slide

- This is the table of contents for the audience; when it first appears it telegraphs the structure of the presentation and helps the audience to follow along. When it reappears, it reminds everyone of where they are in the structure.

- Stick to one major point per slide

- Having two or three major points to make in one slide tends to send a muddled message, whereas two or three well-structured slides where each makes one point will be clearer and take less time to communicate.
 - In CountyStat, typically, the title will communicate the content, and the “call-out” box will make the point.

- Consider which text boxes have the potential to be replaced with a visual

- Text has a tendency to be less effective than diagrams or graphs. They can convey complex interactions.

- Think of each chart as a chunk of information

- When considering how to present the slides, help the audience put the chunks together into a logical whole. Have a “topic sentence” that leads into the slide (this should be the main points). Discuss one to three points that elaborate on the main point, either as bulleted items or messages in a chart/graphic to which you want to draw attention. Conclude with a transition that connects to one slide to the next.

- Trim slides to remove unnecessary text

- Refrain from making slides too wordy. Stick to the main points and keep only details necessary to understanding the main point.

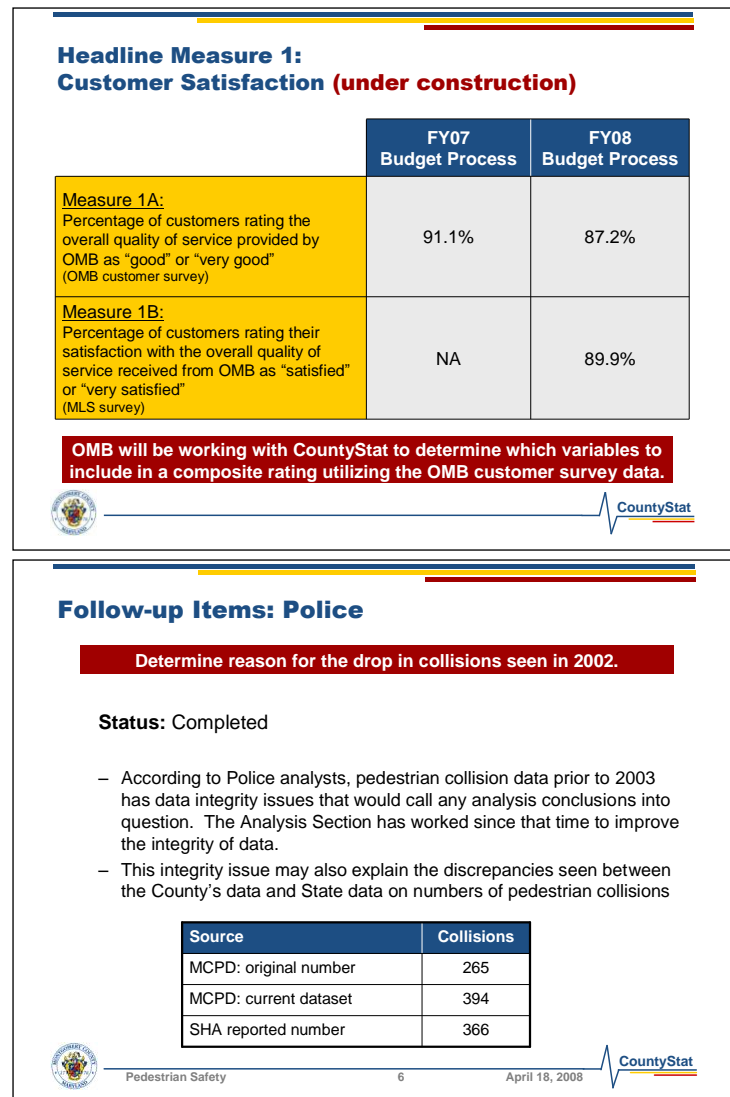


Figure 23 Stick to one major point per slide

Common Causes of Ineffective Presentations

1. Failure to motivate the problem and set up a structure for listening
2. Inadequate structural signals
3. Gaps in logic
4. Excessive detail
5. Poorly designed slides

Making Use of Two Screens At Once

For CountyStat purposes, it is necessary to structure presentations to roll out on two screens. This is an opportunity to display more information at once, and make comparisons using two slides worth of material.

Options to Consider:

Using the Agenda slide

One possibility for using two screens is to provide content on the first slide and use the agenda to as a guide to the presentation on the second screen. It provides a cue to the audience about what's to come – particularly important for complex topics.

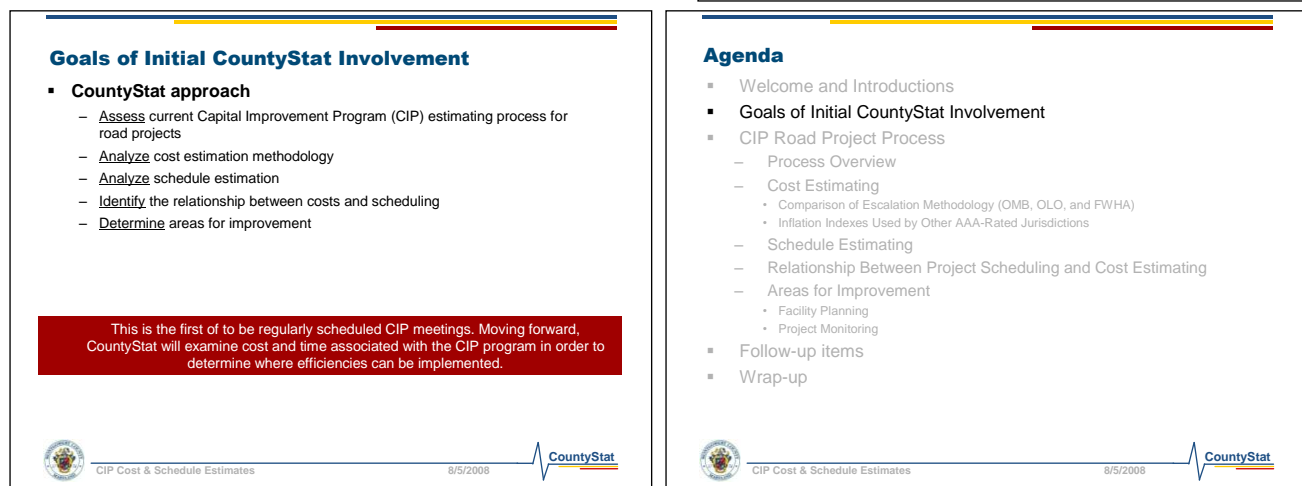
Figure 24 Making Use of the Agenda Slide



Agenda

- Welcome and Overview
- Follow-up from March 7th meeting
 - Status of CountyStat Affordable Housing Process
- Measures for Supply
- Measures of Demand
- Wrap-up

Affordable Housing 3



Goals of Initial CountyStat Involvement

- **CountyStat approach**
 - Assess current Capital Improvement Program (CIP) estimating process for road projects
 - Analyze cost estimation methodology
 - Analyze schedule estimation
 - Identify the relationship between costs and scheduling
 - Determine areas for improvement

This is the first of to be regularly scheduled CIP meetings. Moving forward, CountyStat will examine cost and time associated with the CIP program in order to determine where efficiencies can be implemented.

CIP Cost & Schedule Estimates 8/5/2008

Agenda

- Welcome and Introductions
- **Goals of Initial CountyStat Involvement**
- CIP Road Project Process
 - Process Overview
 - Cost Estimating
 - Comparison of Escalation Methodology (OMB, OLO, and FWHA)
 - Inflation Indexes Used by Other AAA-Rated Jurisdictions
 - Schedule Estimating
 - Relationship Between Project Scheduling and Cost Estimating
 - Areas for Improvement
 - Facility Planning
 - Project Monitoring
- Follow-up items
- Wrap-up

CIP Cost & Schedule Estimates 8/5/2008

Figure 25 CIP Presentation

Comparisons

Another possibility is to use the two screens to make a comparison between two approaches, or between an original measure and its revised version. It can also be used to compare two data sets. In this example, screen one displays the Office of Management and Budget's original headline performance measure and screen two shows the evolution of that measure to its revised version.

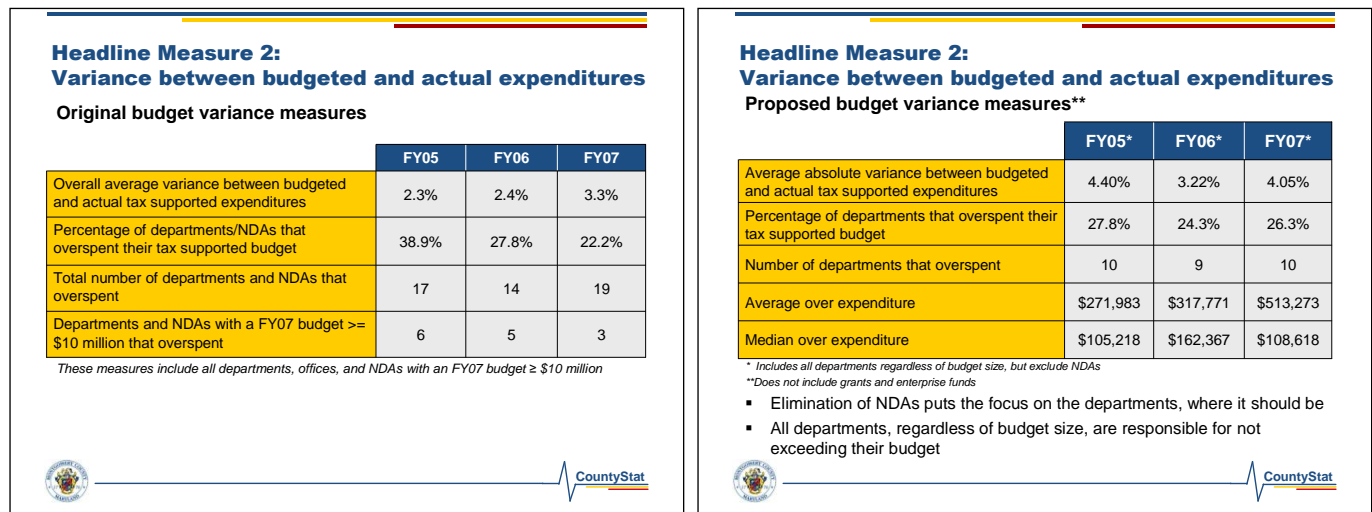


Figure 26 OMB Performance Plan Presentation

Alternative Analysis

A third possibility is to use the second screen to provide an alternative analysis and recommendations. In this case, CountyStat used the second screen to show its own analysis compared to the Department of Economic Development in the presentation and results of its performance measure.

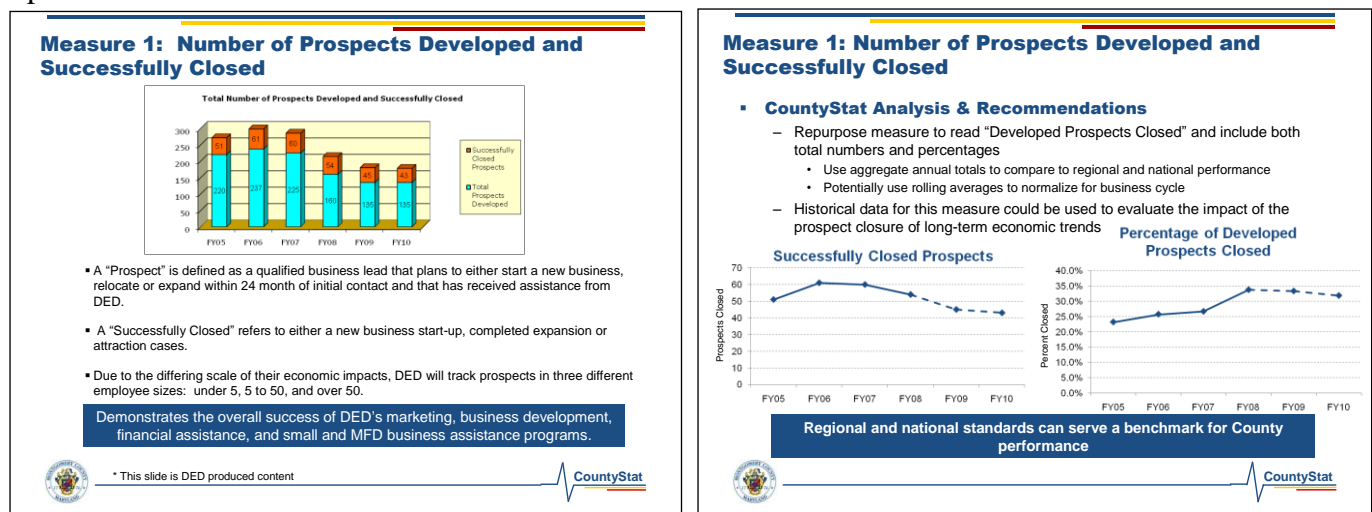


Figure 27 DED Performance Plan Presentation

Basics on Using PowerPoint

Like Word and Excel, Powerpoint has an interface with similar layout and controls, but specifically geared towards creating a slideshow presentation. It has three main areas: the outline pane which gives a view of the slides in list form; the slide panel which shows the slide you are currently editing; and the notes pane, where comments about the slide can be written, but cannot be seen in presentation mode.

Insert a slide

In Normal, Outline, Slide, or Slide Sorter view, select the slide after which you wish to insert a new slide. Then click on the Insert menu, and select New Slide.

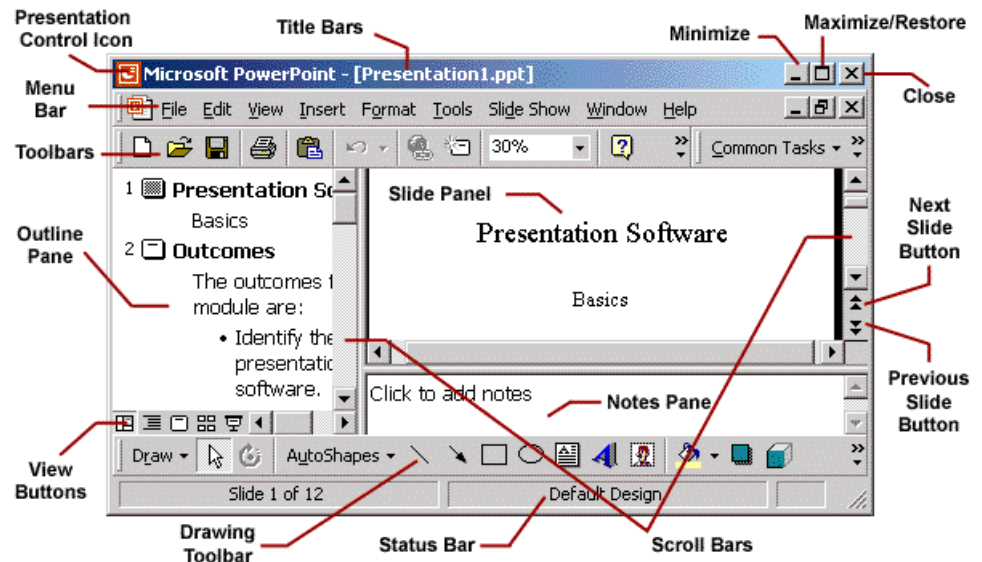
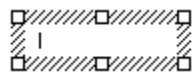


Figure 28 Microsoft Powerpoint Interface

Add text



In Normal



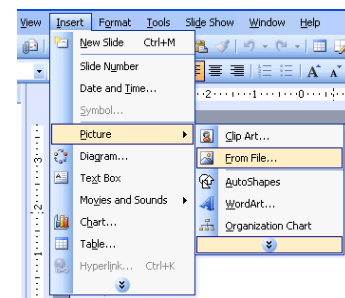
or Slide view, select the slide on which you wish to insert text. If there is already a text box on the slide you may click your mouse on it and start typing. Familiar word processing tools for modifying text (color, style, font, alignment, etc.) are provided.

In Normal or Slide view, to add a new text box to a slide, click on the Insert menu, and select Text Box. Put your mouse over the slide layout - the cursor will change to a narrow down-arrow (as shown on the left below). Click, hold, drag, and release the mouse to form a rectangle on the slide. Then you can type into the text box created for you (as shown on the right below).

Insert an Object

If you want to insert an “object,” including a new slide, text box, chart, table, etc., you will be able to access this through the Insert menu on the menu bar.

Microsoft Powerpoint Insert Menu



Slide Design: CountyStat Guidelines

CountyStat has developed its own design template for its in-house presentations:

CountyStat > Templates > CountyStat_Meeting_Template.pot

In addition to a particular type and size of font and slide organization, CountyStat also sticks to four colors for the most part when crafting presentations, for consistency. They are colors that coordinate together, and stand out on the particular type of presentation equipment we have in our offices.

There are a wide variety of choices available in this program; however, in most cases, less is more. Stick to one font, a few colors, and generally refrain from clutter. This will help the slide best convey it's meaning to the audience with the least confusion. (The CountyStat template imports the proper font and colors for the purposes of its presentations.)

More on color: Color should only be used to clarify meaning. For example, color text for emphasis or add colors to a bar or line chart only when the colors signal substantive differences.

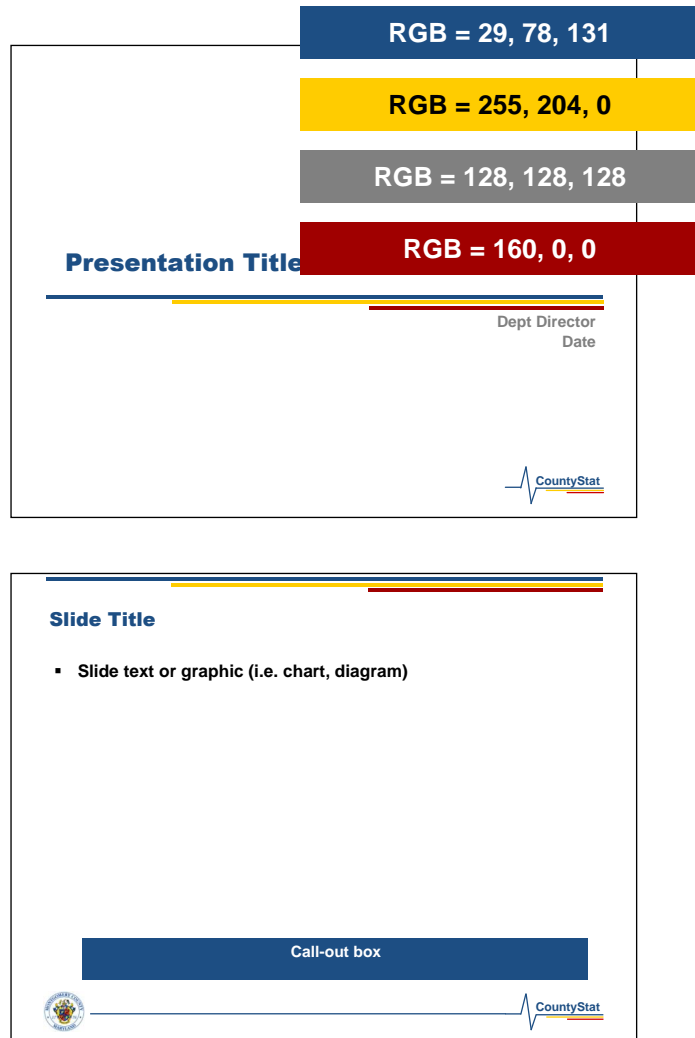


Figure 30 CountyStat Template

Displaying Charts

Being able to succinctly and accurately display chart information is an important aspect of presentation building. Excel and PowerPoint defaults do not do this well at all, so here are guidelines for proper chart display:

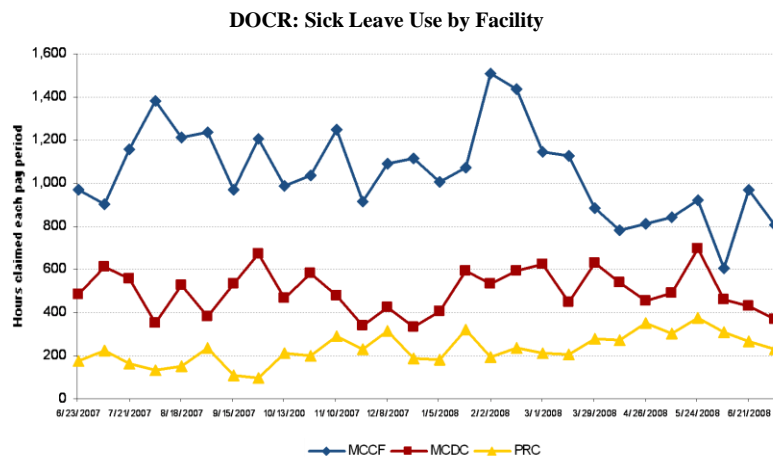


Figure 30 Line Graph: Sick Leave Use in DOCR

- Remove border from around both the chart area and the plot area
- Change lines/bars from the default color scheme to CountyStat color scheme (blue, red, yellow – see previous page)
- Make lines thicker, points larger
- Start the y-axis at zero and make sure axes are properly labeled
- Change the grid lines from solid to dotted
- Change the plot area from gray to white

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